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## PATENT COOPERATION TREATY

PCT/EP2003/000407



Translation

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference D80266PC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/000407	International filing date (day/month/year) 16 January 2003 (16.01.2003)	Priority date (day/month/year) 17 January 2002 (17.01.2002)
International Patent Classification (IPC) or national classification and IPC C07C 51/25		
Applicant STOCKHAUSEN GMBH & CO. KG		

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>4</u> sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>6</u> sheets.</p>	
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>	

Date of submission of the demand 13 August 2003 (13.08.2003)	Date of completion of this report 05 May 2004 (05.05.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP2003/000407

## I. Basis of the report

## 1. With regard to the elements of the international application:\*

- ☐ the international application as originally filed
- ☒ the description:  
pages \_\_\_\_\_ 1-52 \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☒ the claims:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, as amended (together with any statement under Article 19  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_ 1-15 \_\_\_\_\_, filed with the letter of \_\_\_\_\_ 11/02/2004
- ☐ the drawings:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

## 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

## 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/fig \_\_\_\_\_

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

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**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

## 1. Statement

Novelty (N)	Claims	1-15	YES
	Claims		NO
Inventive step (IS)	Claims	1-15	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-15	YES
	Claims		NO

## 2. Citations and explanations

## 1). Reference is made to the following documents:

D1: US-A-4738943

D2: US-A-4720474

D3: US-A-4310704

D4: EP-A-145467

## 2). Novelty

D1 (see examples I and XIV to XVI; and column 6, lines 35 to 54) discloses a method for oxidising 1-hexene to produce 2-hexanone, in which method 1-hexene, oxygen,  $\text{Pd}(\text{CF}_3\text{CO}_2)_2$  and copper(II) salts are brought into contact with each other in a liquid phase based on water and acetonitrile.

D2 also discloses the oxidation of 1-hexene to produce 2-hexanone in a liquid phase based on water and acetonitrile in the presence of  $\text{Pd}(\text{CF}_3\text{CO}_2)_2$ .

D3 (see examples 1 and 21 to 28) discloses a method for oxidising olefins to produce ketones, in which method olefins, aqueous hydrogen peroxide and  $\text{Pd}(\text{CF}_3\text{CO}_2)_2$  are brought into contact with each other

in ethyl acetate as solvent. The liquid phase in this reaction therefore consists of water and ethyl acetate.

Documents D1 to D3 do not mention the additional use of a bidentate ligand XNY or the use of a solvent containing polyethylene glycol ether. The subject matter of claims 1 to 4, 14 and 15, and that of the dependent claims, is thus novel over D1 to D3.

D4 discloses a method for producing  $\alpha,\beta$ -unsaturated carboxylic acids from olefins using a supported Pd-containing catalyst. Acetone is obtained as a by-product in the production of acrylic acid from propylene.

#### Inventive step

The present invention is considered to address the problem of developing a method for oxidising unsaturated hydrocarbons in which allylic and vinylic oxidation products can be obtained.

It was not to be expected from prior art teaching that acetone and acrylic acid could be selectively produced from the Pd-catalysed oxidation of propylene in the presence of the ligands  $\text{RCO}_2^-$  and XNY, or in the presence of the ligand  $\text{RCO}_2^-$  and a liquid phase based on a mixture of protic and aprotic polar solvents. The subject matter of claims 1 to 4, 14 and 15, and that of the dependent claims, thus involves an inventive step.